

Fig 1

<u>Inst</u>	<u>Hit/Miss</u>	<u>Data</u>	
18 — LDR [R _m]	Hit	Data [R _m]	
MOV	N/A	—	
CMP	N/A	—	
⋮	⋮	⋮	
20 — LDR [R _m]	Miss	—	<div> <div></div> <div>variable delay</div> <div></div> </div>
MOV	N/A	—	
CMP	N/A	Data [R _m]	
⋮			
22 — LDR [R ₁]	Miss	—	
24 — LDR [R ₂]	Miss	—	
MOV	N/A	—	
CMP	N/A	28 — Data [R ₂]	<div> <div>missed data returned out of order</div> </div>
ADD	N/A	26 — Data [R ₁]	

Fig. 2

Instruction Trace Stream

...

30 — LDR [R1] -- miss
 MOV
 CMP

34 — LDR [R2] -- hit
 LDR [R3] -- miss

38 — ADD
 MOV
 SUB
 ...

Data Trace Stream

...

32 — Data Place Holder Tag 1
 —
 —

36 — Data [R2]
 Data Place Holder Tag 2

40 — —

42 — Late Data Tag 2 [R3]
 Late Data Tag 1 [R1]
 ...

Fig. 3

Instruction Trace Stream

...

46 — LDR [R1] -- miss
 CMP
 ADD
 LDR [R2] -- hit

50 — LDR [R3] -- miss
 SUB
 MOV

56 — LDR [R4] -- miss
 CMP
 MOV
 ...

Data Trace Stream

...

48 — Data Place Holder Pending
 —
 —

52 — Data [R2]
 Data Place Holder 1 pending
 Late Data [R1]

54 — —

58 — Data Place Holder 1 pending
 Late Data [R3]
 Late Data [R4]
 ...

Fig. 4

Instruction Trace Stream

62 (LDR [R1] --- miss)
 (MOV)
 SUB
 ↓
 earliest trace info.
 SYNC {1 pending}
 60 LDR [R2] --- miss
 CMP
 ADD
 64 LDR [R3] --- hit
 MOV
 SUB
 CMP
 ...
 ...

Data Trace Stream

(Data Placeholder)

 66 Data Placeholder
 68 ~~Late Data [R1]~~

 Data [R3]
 Late Data [R2]
 70 ---

 ...
 ...

Fig. 5

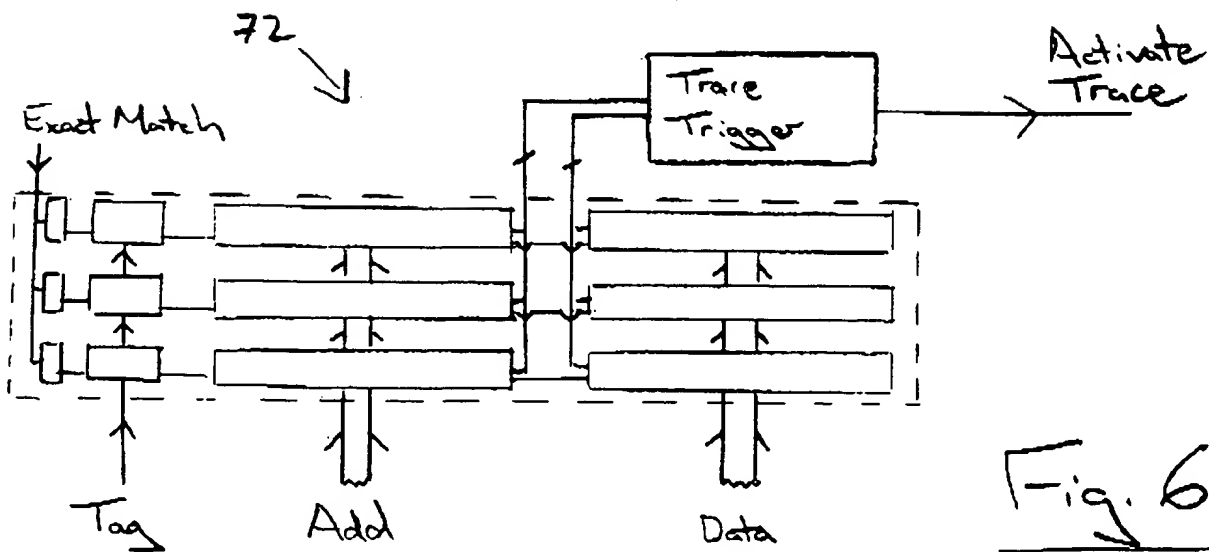


Fig. 6

Instruction
Stream

Data
Stream

② — LDR [R1] — miss
74 — CMP
MOV

76 — Data [R1] — ①

Fig. 7

Exact Match	Add Match	Data Match	Trace Activation Point
✓	✓	✓	①
✓	✓	X	none
X	✓	✓	②
X	✓	X	②

Fig. 8

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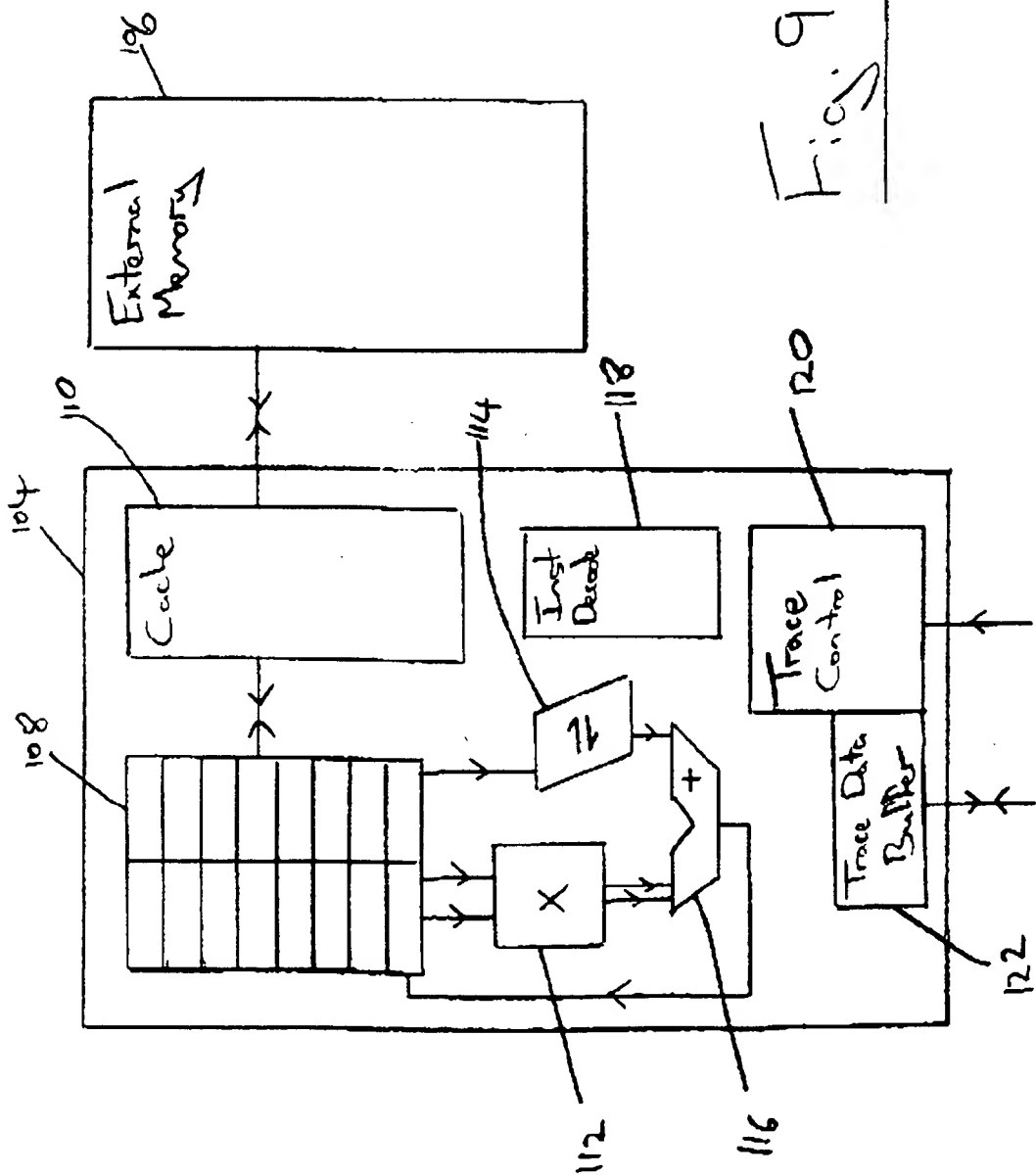


Fig. 9

LSM $R_n[Add]$, $RegList$

16 bits

0000100010001011



R0	
R1	
R3	R11
R7	

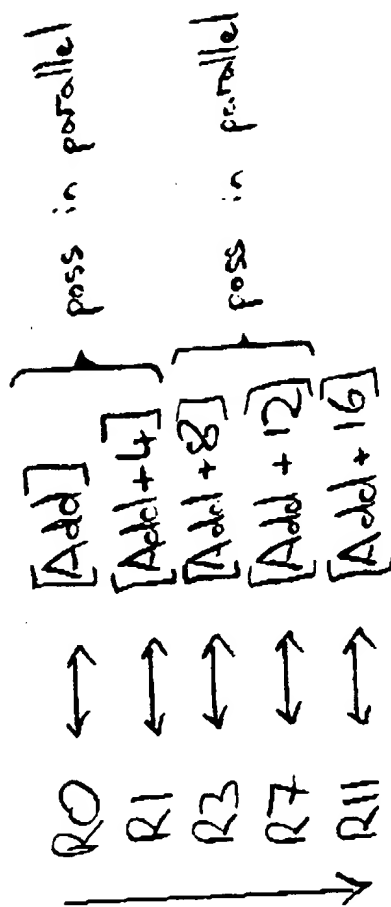


Fig. 10

R0 $\xleftrightarrow{DW_1}$ [Add]

R1 $\xleftrightarrow{DW_2}$ [Add+4]

R3[#] $\xleftrightarrow{DW_3^*}$ [Add+8][!]

R7 $\xleftrightarrow{DW_4}$ [Add+12]

R11 $\xleftrightarrow{DW_5}$ [Add+16]

Trace
Trigger

Trace
to
End



Trace Data Stream

..... {LSM}, {DW₃}, {Add+8}, {Place Holder}, {Place Holder},

← Count back to R3

Fig. 11

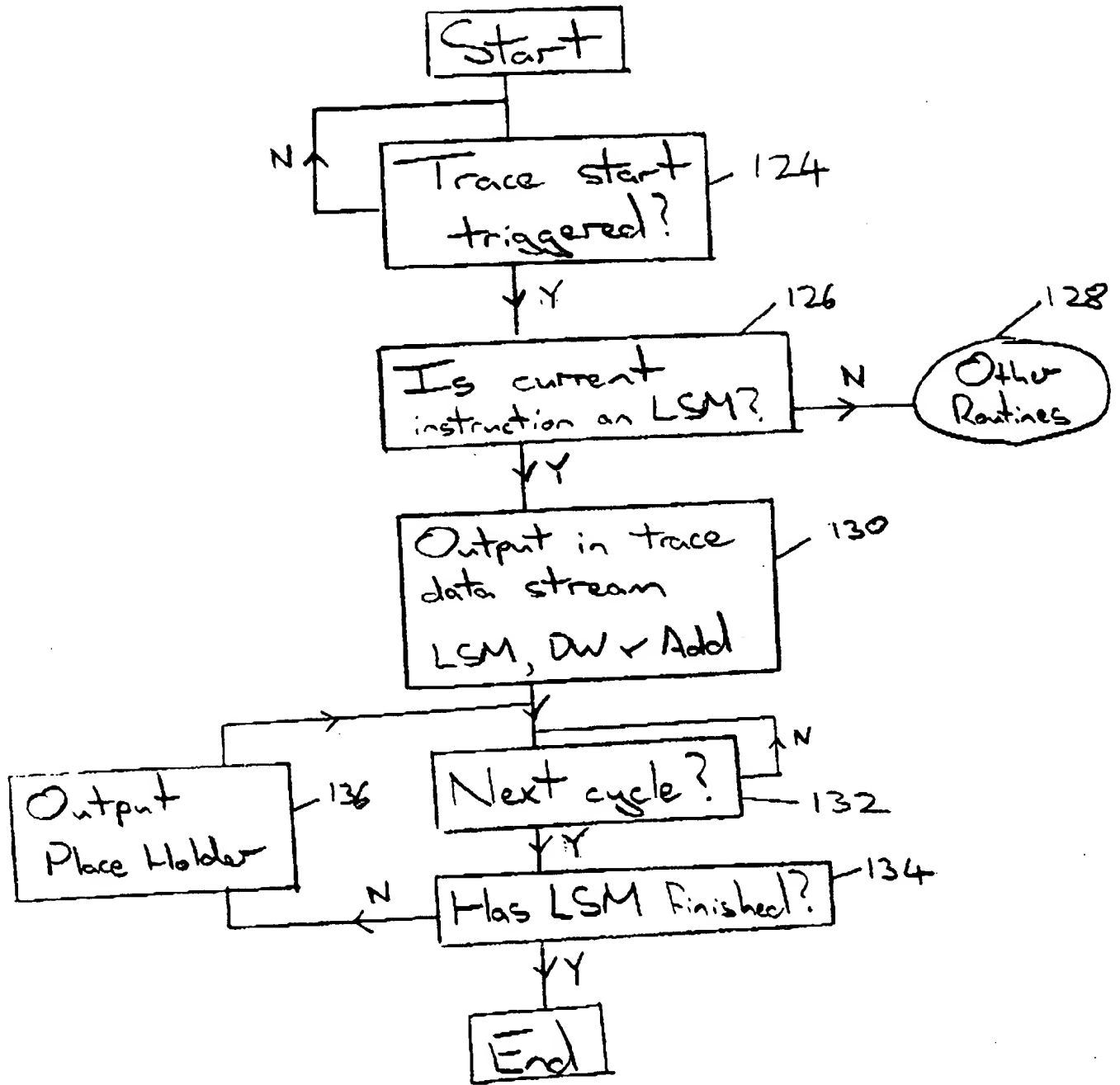


Fig. 12

Patented 2006

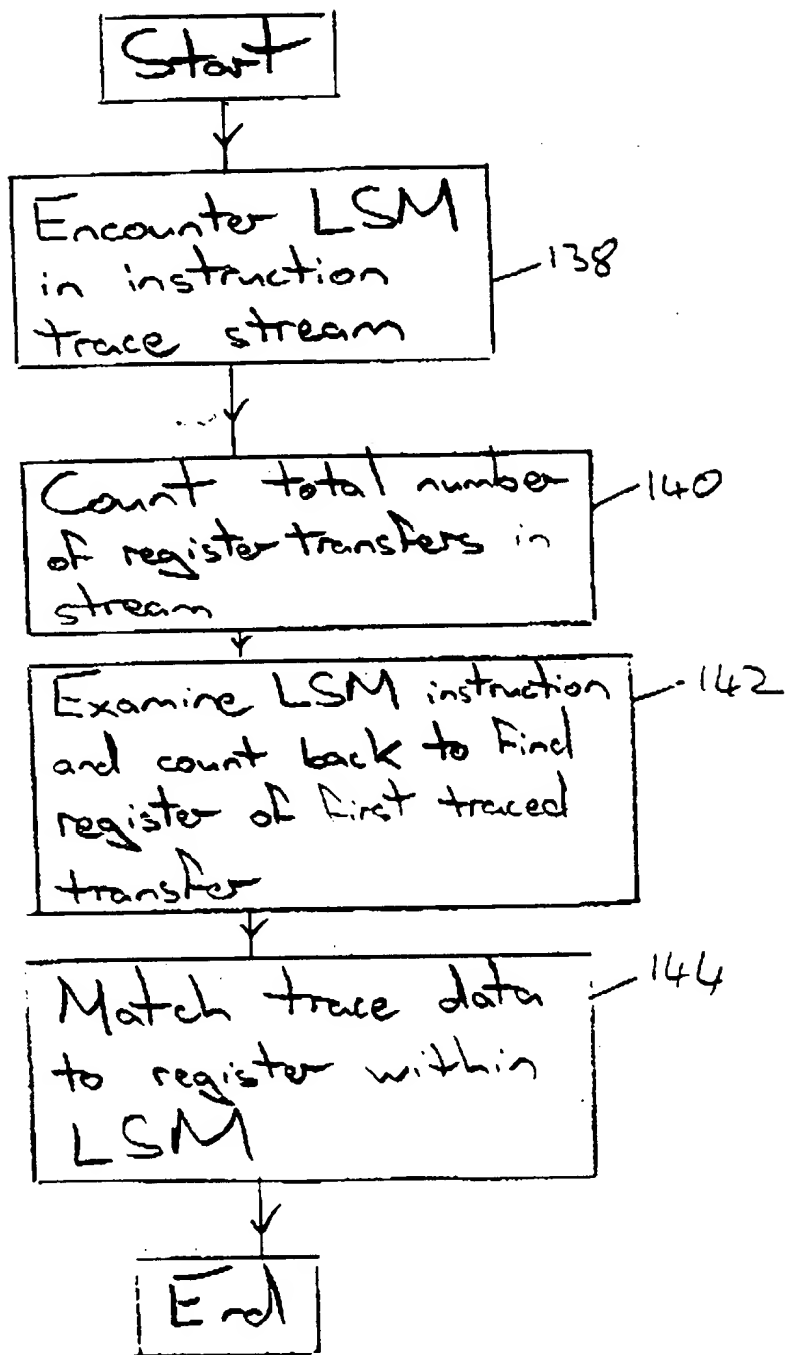


Fig. 13